ON ROLLING DOWNS FOSSILS COLLECTED BY PROF. J. W. GREGORY.

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Plates I. and II.

During the excursion [1] conducted by Prof. J. W. Gregory, in the summer of 1901-2, a number of Cretaceous fossils were collected in the critical area to the north-west of Lake Eyre. In this area Upper Albian [2] beds, typically developed at Dalhousie Springs, Charlotte Waters, and Woodduck Creek, overlap the Upper Aptian beds of the Peake, Primrose Springs, and neighbouring districts. The collection, which is lodged in the Geological Department of the University of Glasgow, was kindly lent to the writer by Prof. Gregory.

Lamellibranchs, Gastropods, Scaphopods, and Cephalopods (Belemnites) were collected. The Belemnites, which are entirely free from matrix, came from Woodduck Creek, the remainder of the collection having been made at the Peake Station. These latter specimens are embedded in a fine-grained bluish-grey limestone similar to that from Wollumbilla and the Walsh River, in Queensland. In some cases, however, the limestone of the matrix and the calcite and aragonite of the tests are largely converted into gypsum.

Genus Pseudavicula, Etheridge, Jr.

Pseudavicula anomala [3] (Moore).

Pl. i., figs. 1-3.

1870. *Lucina anomala,* Moore, Q.J.G.S., vol. xxvi., p. 251, pl. xiv., fig. 4.
1870. *Lucina (?) australis,* Moore, *Id.*, pl. xiv., fig. 5.

From a study of the large suite of specimens in the present collection, and of a collection from various localities lent by the Geological Survey of Queensland, the writer is unable to uphold the specific identity of *Pseudavicula australis* (Moore). The two specimens figured by Moore have, unfortunately, been lost. Speaking of "*Lucina (?) australis*" he [4] remarked "this shell may be distinguished from *L. anomala* by the costae being finer; and, although it is larger, the anterior hinge-line is less extended." Etheridge, [5] in 1892, wrote: "*P. australis* is decidedly larger than that I take to be *P. anomala,* and although the sculpture is of the same type it is never, so far as my experience goes, so sharp and regular. The test of *P. australis* must have been very thin as it is seldom actually preserved." Later still Etheridge [6] remarked that *P. anomala* "is a smaller and more delicate form than *P. australis* and highly gregarious."

(1) See J. W. Gregory, "The Dead Heart of Australia." London, 1906.

(2) The evidence for this will be given in a later paper (Mems. Q'land Mus.) dealing with the Ammonoidea.

(3) In this paper only the original reference to the species and the references after the year 1902 are given in the synonymy. For references up till 1902 see Appendix II. (Etheridge and Dun) to Mem. Geol. Surv., N.S. Wales, Pal. No. 11, 1902.

(4) C. Moore, Q.J.G.S., vol. xxvi., 1870, p. 252.

(5) R. Etheridge, Jr. (in Jack and Etheridge), "Geology and Pal. of Queensland," etc. Brisbane and London, 1892, p. 451.

(6) R. Etheridge, Jr., Mems. Roy. Soc. S. Austr., ii. (1), 1902, p. 16.

Three points of difference were thus indicated by these authors—size, strength of costae, and length of anterior hinge-line. The last-named criterion may be dismissed, for the umbones in *Pseudavicula* are practically terminal and Moore's original *P. australis* had the anterior portion broken. The examination of a large number of specimens has convinced the writer that, while there is a certain variation in strength of costae, yet, by taking Moore's figures as types, no division into two groups is possible from this feature. There is a complete gradation between forms of different costal sharpness; and this gradation is often well shown in specimens embedded in the same block of matrix. Similar remarks apply to the criterion of size. Caution must be observed in comparing the ornamentation of specimens of this species; for the nacreous shell exfoliates so easily that one is liable, at times, to confuse an exfoliated surface with the original surface of the test. But a comparison of external moulds (for the external ornamentation) and of internal moulds (for internal ornamentation) has led the writer to believe that the gradation is continuous.

One group, however (typified by the form figured by Etheridge, *loc. cit.*, 1892, pl. 24, fig. 8), may eventually require separation from *P. anomala;* but it cannot, of course, receive the name *P. australis.*

The hinge-line of the genus has not been satisfactorily observed hitherto. One specimen, in the present collection, however, shows the hinge of a left valve, while further information is available from the cardinal regions of internal moulds. The hinge is typically aviculid (compare, *e.g.*, the hinge of *Pseudomonotis* figured by Pompeckj [7]). It is edentulous with a narrow rectangular ligament pit on the posterior portion. A slight inflection of the hinge-line provides a rudimentary type of articulation (see pl. i., figs. 1, 2). No byssal sinus is present in the right valve.

Genus Maccoyella, Etheridge, Jr.

Maccoyella barklyi (Moore).

1870. *Avicula barklyi*, Moore, Q.J.G.S., p. 245, pl. xi., figs. 1, 2.
1915. *Maccoyella barklyi*, Newton, Proc. Malac. Soc., vol. xi., pt. iv., p. 225, pl. vi., fig. 19.

A large number of specimens of this species, mainly fragmentary, are in the collection. All are at the stage where quaternary ribs are developed. The significance of this stage of ornamentation will be discussed in a forthcoming paper.

Genus Pecten, Müller.

Subgenus Camptonectes, Agassiz.

Pecten (Camptonectes) socialis, Moore.

1870. *Pecten socialis*, Moore, Q.J.G.S., vol. xxvi., p. 248, pl. xi., fig. 9.

The specimens of this species in the collection are all internal moulds similar to the form originally described by Moore. Moore's specimen has been lost; but until more perfect specimens are figured than those already known, it is inadvisable to choose a neotype.

Frequently since the Bathonian, with its *P. (C.) lens*, J. Sow., the group of smaller *Camptonectes* (as distinct from the group of large forms typified by *P. (C.) cinctus*, J. Sow.), has given rise to forms of a rather uniform type, thereby making specific distinctions rather difficult. The Upper Cretaceous forms of Europe, *e.g.*, are seriously in need of revision, and though many specific names are in existence the number of species is probably small. *P. (C.) striatopunctatus*, Römer, especially the smaller forms like those figured by Pictet as

[7] J. F. Pompeckj, Neu. Jahrb. f. Min., etc., B. Bd. xiv., 1901, pl. xv., fig. 15.

P. arzierensis, de Loriol,[8] is very similar to *P. (C.) socialis*, differing in size and in the greater number of ribs. Römer's species is typical of Hauterivian, but has been recorded from the Valanginian and even as high as the Upper Gault. *P. (C.) curvatus*, Geinitz,[9] widespread in the Upper Gault (but ranging much higher also), is similar, but is again larger and has thicker ribs. *P. (C). projectus*, Tate, from the Uitenhage beds of South Africa, is also very similar.

Subgenus Syncyclonema, Meek.

Pecten (Syncyclonema) gradatus (Eth. fil.).

1902. *Protamusium (?) gradatum*, Etheridge, Jr., Mem. Roy. Soc. S. Austr., ii.,[10] p. 10, pl. i., fig. 14.

Only one specimen of this species is present, showing even less detail than the holotype. Etheridge quoted five genera which may have claims to include the species, and, while placing it provisionally in *Protamusium*, he seemed to regard *Amusium* as a very probable genus for it. The rugosity of the exterior and smoothness of the interior, however, together with the absence of the long crura, remove it decidedly from *Amusium*. Woods[11] has pointed out that the name *Protamusium* must be abandoned, since the type species quoted by Verrill, *Pecten demissus*, Phill., is the type of *Entolium*, which has precedence. He remarks further that *Entolium* should probably be united with *Syncyclonema*.

Even if the two genera are to remain distinct the present species must be referred to *Syncyclonema* (Genotype *Pecten rigidus*, M. and H.). It is rather to be deplored that a new name should be given to such a poor specimen as the holotype of the present species. However, the small portion of adherent test on the specimen allows a reconstruction to be made and to show that the surface of the left valve was ornamented by strong concentric costae. It is the opinion of the writer that the long-lived (Hauterivian to Upper Cenomanian) *P. (S.) orbicularis*, J. Sow.,[12] has been the main stock from which most of the other Cretaceous members of the subgenus evolved. But for the strong costation, *P. (S.) gradatus* is very similar to this European species.

Genus Modiola, Lamarck.

Modiola subsolenoides, Hudleston.

1890. *Modiola subsolenoides*, Hudleston, Geol. Mag. Dec., iii., vol. vii., p. 245, p. ix., fig. 8.

1902. *Modiola subsolenoides*, Etheridge, Jr., Mem. Roy. Soc. S. Austr., ii. (1), p. 22.

1902. *Modiola dunlopensis*, Etheridge, Jr., Mem. Geol. Surv. N.S. Wales, Pal. No. 11, p. 23, pl. v., figs. 4, 5; pl. vi., figs. 1, 2; pl. vii., fig. 1.

An examination of Hudleston's type, in the British Museum (Nat. Hist.) Collection, has shown that this species is identical with Etheridge's *M. dunlopensis*.[13] In the present collection it is represented by fragments only. The species is very similar to the Aptian to Upper Albian, *M. subsimplex*, d'Orb.,[14] but attains a larger size. The Upper Neocomian *M. rectior*, Wollemann,[15] may be closely compared with the straighter forms of *M. subsolenoides*.

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(8) Pictet, Foss. Terr. Cret. de St. Croix, 4th part, 1868-71, p. 195, pl. clxxi., fig. 3.

(9) See Geinitz, Die Verstein. von Kieslingswalda, 1843, p. 16, pl. iii., fig. 13.

(10) See Tate, Q.J.G.S., vol. xxiii., 1867, p. 155, pl. ix., fig. 6; also Kitchin, Ann. South African Mus., vol. vii., No. 3, 1909, p. 66, pl. ii., fig. 5.

(11) Woods, Mon. Cret. Lamellibranchiata, vol. i. (Mon. Pal. Soc.), p. 145.

(12) J. Sowerby, "Mineral Conchology," vol. ii., p. 193, pl. 186.

(13) Etheridge, *loc. cit.* (N.S. Wales), 1902, p. 23, pl. v., figs. 4, 5; pl. vi., figs. 1, 2; pl. vii., fig. 1.

(14) See d'Orbigny, Pal. Franc. Cret. Terr., vol. iii., p. 269, pl. cccxxxviii., figs. 1-4 (as *M. simplex*).

(15) Wollemann, Zeit. d. Deutsch. Geol. Gessell., vol. xlviii., 1896, p. 844, pl. xxi., fig. 6.

Certain forms (*e.g.*, the specimen figured by Etheridge, *loc. cit.*, N.S. Wales, 1902, pl. vii., fig. 1) connect the species with *M. angusta* (Hudl.).[16] The latter species exhibits the "ensiform" type of shell originally characteristic of Middle Jurassic beds (*e.g., M. sowerbyana*, d'Orb., *M. icaunensis*, de Loriol, etc.), but reappearing in the Cretaceous in such species as the Neocomian, *M. baini*, Sharpe,[17] and the long-lived Upper Cretaceous, *M. flagellifera*, Forbes.[18] The Neocomian, *M. gillieroni*, P. and C.,[19] is also similar.

Modiola cupula, n. sp.

Pl. i., fig. 4.

Sp. Chars. Shell curved-pyriform in outline, rather narrow, tapering acutely towards the anterior end. Test moderately thick, ventral margin concave, dorsal margin long and very slightly convex; posterior margin regularly rounded. Antero-ventral portion of the shell narrow and sharply bevelled, the dividing edge between the two areas rounded. Ornamentation by regular fine growth striae. Byssal sinus not apparent.

The species is represented by a number of specimens, most of which, including the holotype, are in the form of external moulds. The species is closely related to *M. eyrensis*, Eth. fil.,[20] from which it may be distinguished by its slightly greater curvature and longer hinge-line. It may perhaps form a link between that species and *M. subsolenoides*, Hudl. *"Mytilus" rugocostatus*, Moore,[21] is also very similar, but has a shorter hinge-line and develops concentric rugae. The correct relationship of these Rolling Downs *Mytilidae* cannot be determined, however, till the zonal range of the species is known.

Owing to the simplicity of its characteristics *M. cupula* might well be compared with the forms from many horizons. Perhaps the foreign species most similar is *M. subsimplex* (d'Orb.).[22]

Genus Mytilus, Linnaeus.

Mytilus inflatus, Moore.

1870. *Mytilus inflatus*, Moore, Q.J.G.S., vol. xxvi., p. 252, pl. xiii., fig. 4.

This species is represented by numerous specimens. There is a considerable amount of shape variation in the species, grading, apparently continuously, from wide forms, such as that shown on pl. ii., fig. 12, of the South Australian Memoir (Etheridge, *loc. cit.*, 1902), to elongate forms with truncate antero-ventral region.

M. primulafontensis, Eth. fil.,[23] is very closely related, and apparently connects the species with *Modiola eyrensis*, Eth. fil. On the other hand, the unique *M. palmerensis*, Eth. fil.,[24] may also be related; but it is so distinct from the usual mytilid type that it is difficult to make comparisons with foreign forms.

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(16) Hudleston, Geol. Mag., 1884, i. (3), p. 341, pl. ii., fig. 5. The Hudleston collection (in the British Museum) contains a number of specimens of the species in good preservation. Unfortunately a rather distorted form was figured under the name *Gervillia angusta*. The species is identical with, and must replace the name *M. ensiformis*, Eth. fil. (*loc. cit.*, 1902, S. Austr., p. 22, pl. iii., figs. 8-12).

(17) See Sharpe, Trans. Geol. Soc. Lond., ser. 2, vol. vii., 1856, p. 193, pl. xxii., figs. 2, 3.

(18) See Forbes, Trans. Geol. Soc., ser. 2, vol. vii., 1856, p. 152, pl. xvi., fig. 9; also Woods, loc. cit., p. 99, pl. xvii., figs. 1, 2.

(19) Pictet and Campiche, Foss. Terr. Cret. de St. Croix, iii., pt. 1864-7, p. 503, pl. cxxxiii., figs. 9, 10.

(20) Etheridge, *loc. cit.*, 1902 (S. Austr.), p. 22, pl. ii., figs. 5-9.

(21) Moore, *loc. cit.*, p. 252, pl. xiii., fig. 2.

(22) d'Orbigny, *loc. cit.* (v. supra).

(23) Etheridge, *loc. cit.*, 1902 (S. Austr.), p. 18, pl. ii., figs. 22-24.

(24) R. Etheridge, Jr., Bull. Geol. Surv. Q'land, No. 13, 1901, p. 21, pl. ii., fig. 9.

One specimen in the collection has developed faint radial costulae. The appearance of this feature strengthens the view the writer has long held that the names *Brachydontes, Mytilus, Lithophagus,* etc., as commonly used, have a morphic rather than a generic significance. and that, in each case, they cover heterogenous groups repeatedly derived from the persistent *Modiola* stock. No more systematic significance should be attached to them, it is believed, than to the comprehensive "*Gryphaea*" and "*Exogyra*." At numerous horizons one is confronted with the difficulty of deciding whether a species should be allotted, e.g., to *Modiola* or *Mytilus* in their accepted sense;[25] and the conchological distinction on which a division is made rests on such slender foundations that one would be surprised if the groups are homogeneous. So with other "genera." The group designated *Lithophagus,* Mühlf., *e.g.* (=*Lithodomus,* Cuv.), represents, in the writer's opinion, diverse branches of *Modiola* that have adopted a boring habit. The whole group presents other interesting problems (*e.g.,* the repeated appearance of "ensiform" types); but it has attracted so little systematic attention that it is not possible to make the suggestions given above more definite at present. The writer is convinced that a detailed chronological analysis of many Lamellibranch groups would make this class infinitely more valuable for zonal work than it is at present; and that, as Spath[26] has hinted, the Lamellibranchs owe their present limited zonal value to the fact that, systematically, they are little used.

Genus Thracia, Leach.

Thracia primula, Hudleston.

Pl. i., fig. 5.

1890. *Thracia primula,* Hudleston, Geol. Mag. Dec., iii., vol. vii., p. 245, pl. ix., fig. 7.

One specimen is present agreeing with Hudleston's type (B.M. Coll.). The species is closely related to the slightly lower, *T. wilsoni,* Moore.[27] The latter species occurs at Wollumbilla and in the chert beds of Maryborough, in Queensland (3 specimens are in the Sedgwick Museum Collection). *T. primula* is more transversely elongate, has a somewhat wider ante-carinal area, and is, apparently, less tumid than *T. wilsoni.*

T. wilsoni is very similar to the Hauterivian and Lower Barremian *T. phillipsi,* Römer,[28] while, perhaps, *T. primula* is most like the unnamed form[29] from the basal Hauterivian[30] (Uitenhage) beds of South Africa. The Lower Aptian, *T. robinaldina,* d'Orb.,[31] is also very similar. The Canadian *T. semiplanta,* Whiteaves,[32] is closely comparable, but its precise horizon is unknown. The difficulty, mentioned above in the case of *Camptonectes,* of making comparisons with a genus of limited variation, is met with here; and in addition to the Cretaceous species enumerated above, even such Jurassic forms as the Oxfordian *T. depressa,* Sow., might well be cited for comparison.

(25) *E.g.,* there is apparently, as indicated above, a definite inter-relationship between the various Rolling Downs species at present distributed between *Modiola* and *Mytilus.*

(26) Spath, Trans. Roy. Soc. Edinburgh, vol. lii., pt. i., 1922, p. 94.

(27) Moore, *loc. cit.,* p. 254, pl. xiv., fig. 8; holotype (still preserved in Bath Mus. Coll.), refigured by Etheridge, *loc. cit.* (1892), pl. xxviii., figs. 10, 11.

(28) See Woods, *loc. cit.,* vol. ii., p. 240, pl. xxxix., figs. 7-9.

(29) Kitchin, *loc. cit.,* p. 160, pl. viii., fig. 5.

(30) See Spath, Geol. Mag., vol. lxi., 1924, correlation table (opp. p. 80).

(31) d'Orbigny, *loc. cit.,* p. 380, pl. ccclxxii., figs. 1, 2.

(32) Whiteaves, "Mesozoic Fossils," vol i. (Canadian Geol. Surv.), 1884, p. 221, pl. xxix., fig. 5. This species was recorded "subdivision C of Mr. Dawson's report"; but, to judge from the Ammonites figured from the same "subdivision" many horizons are represented in this assemblage of fossils.

Etheridge[33] placed the two species in the genus *Corimya*, Agassiz. This, however, is synonymous with the pre-established *Thracia*, Leach.

Genus Cyrenopsis, Etheridge, Jr.

Cyrenopsis spp. indet.

Many fragments in the collection no doubt belong to several of the species included by Etheridge[34] in *Cyrenopsis;* but, being fragments, they cannot be determined specifically with any precision.

The genus cannot be regarded as definitely established, for the hinge structure is still very imperfectly known. The present fragments add nothing to our knowledge of the genus.

Genus Fissilunula, Etheridge, Jr.

? Fissilunula clarkei (Moore).

1870. *Cytherea clarkei*, Moore, Q.J.G.S., vol. xxi., p. 250, pl. xiii., fig. 1.
1915. *Fissilunula clarkei*, Newton, Proc. Malac. Soc., vol. xi., p. 223.

This species is doubtfully represented by fragments.

Genus Gari, Schumacher.

Gari elliptica, n. sp.

Pl. i., figs. 7, 8.

1901. *Tatella maranoana*, Etheridge, Jr., Geol. Surv. Q'land, Bull. 13, pl. ii., fig. 8 (only).
1902. *Tatella maranoana*, Etheridge, Jr., Mem. Roy. Soc. S. Austr., ii. (1), pl. ii., fig. 25 (only).

Sp. chars. Shell elongated, length nearly twice the height, inequilateral, equivalve. Outline forming a regular subelliptical curve only very slightly modified in the umbonal regions. Ornamentation by growth striae. Umbones insignificant, pressed close together. Anterior adductor scar deeply impressed and bounded by radial ridges; posterior scar of normal impress. Anterior scar linguiform, narrowing dorsally, with a concave semicircular dorsal boundary. Posterior scar subcircular with a long, narrow, rather deeply impressed attenuation towards the umbo. Pallial sinus large, extending more than half the length of the shell, and with a linear postero-dorsal extension. Hinge-line strengthened by a small medial umbonal thickening.

Remarks. In all features—shape, ornamentation, shape and size of muscle scars, type of pallial sinus, internal anterior radial ridges and small umbonal thickening of the hinge-line—this species agrees perfectly with *Gari*, Schum. (=*Psammobia*, Lam.). Further, there is an indication on the internal mould, figured herewith, that the left valve had one small cardinal tooth fitting between two teeth of the right valve of precisely similar type to the normal *Gari* dentition.

There seems to be not the slightest doubt that the species is a typical *Gari*, and this is of importance since, although many other Cretaceous species have been referred to this genus, their claim to such a place has in no case been definitely established. Until the generic positions of such species are determined it is useless to make comparisons, though it may be pointed out that the Uitenhage, *G. (?) atherstoni*, (Sharpe)[35] which certainly has a strong claim to the genus, is rather similar to *G. elliptica*.

(33) Etheridge, *loc. cit.*, 1892, p. 481; and 1902, (S. Austr.), p. 36.

(34) Etheridge, *loc. cit.*, 1902 (N.S. Wales), p. 28.

(35) Sharpe, *loc cit.* (1856), p. 196, pl. xxii., fig. 11.

As holotype may be taken the specimen figured by Etheridge [36] in 1901.

A glance at the various figures published by Etheridge as *Tatella maranoana* will show that several distinct types have been included under that name. The figure of the holotype, described as *Corbicella (?) maranoana,* Eth. fil.,[37] shows a well-preserved exterior. The other specimen figured under that name in the same volume (pl. xxviii., figs. 2 and 3) is an internal cast, and it is hard to believe that the two are specifically identical. Figures published by Etheridge, in later works, show other different forms covered by the same name. An examination of the present collection has shown that, at least, two genera are included.

The figures published by Etheridge fall into five groups, thus:—

1. Geol. Pal. Q'land (1892), pl. xxvii., figs. 4, 5; *Tatella maranoana* (Eth. fil.).
2. Geol. Pal. Q'land (1892), pl. xxviii., figs. 2, 3; *T.* sp.
3. Q'land Geol. Surv., Bull. 13 (1901), pl. i., fig. 5; *T. (?) aptiana,* n. sp. Q'land Geol. Surv., Bull. 13 (1901), pl. iii., fig. 4. Mem. Roy. Soc. S. Austr. (1902), II. (1), pl. iii., figs. 28, 29.
4. Q'land Geol. Surv., Bull. 13 (1901), pl. ii., fig. 8; *Gari elliptica,* n. sp. Mem. Roy. Soc. S. Austr., II. (1), (1902), pl. ii., fig. 25.
5. Mem. Roy. Soc. S. Austr., II. (1), (1902), pl. ii., fig. 26; *G. (?)* sp.

Genus Tatella, Etheridge, Jr.

Tatella (?) aptiana, n. sp.

Pl. i., figs. 9, 10.

1901. *Tatella maranoana,* Etheridge, Jr., Q'land Geol. Surv., Bull. 13, pl. i., fig. 5, pl. iii., fig. 4 (only).

1902. *Tatella maranoana,* Etheridge, Jr., Mem. Roy. Soc. S. Austr., ii. (1), pl. iii., figs. 28, 29 (only).

Sp. chars. Shell, thin elongated, subequilateral, equivalve; slightly gaping anteriorly and posteriorly. Dorsal margin almost straight; ventral margin slightly but regularly convex. Surface smooth. Hinge-line with two simple strong cardinal teeth in the right valve and one tooth in the left which fits in between the two former. A small posterior lateral is also present. Posterior cardinal of the right valve larger than the anterior. Hinge-line strengthened by a medial umbonal thickening which gives a bifid appearance to the internal mould of the umbones. Adductor scars subequal; the anterior scar linguiform truncated dorsally; posterior scar drop-shaped attenuated towards the umbo.

As holotype may be taken the specimen figured by Etheridge [38] in 1902.

Remarks. As mentioned above this species must be separated from *T. maranoana,* Eth. fil., and there is a possibility that it may even be generically distinct. The species may be closely compared with *Gari elliptica.* The type of dentition, the details of the muscle scars, the internal anterior ridge, and the thickening of the hinge-plate are similar. Generic differences occur in the shallow pallial sinus and the much more massive teeth. It seems probable, therefore, that *Tatella,* at least as represented by *T. (?) aptiana,* is an offshoot from *Gari,* or *vice versa.* The Middle Jurassic *Quenstedtia* is also very similar; but no species of the latter are known in Upper Jurassic or later beds.

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(36) Etheridge, Jr., Geol. Surv. Q'land, Bull. 13, 1901, pl. ii., fig. 8.

(37) Etheridge, Jr., *loc. cit.* (1892), pl. xxvii., figs. 4, 5.

(38) Etheridge, Jr., *loc. cit.*, S. Austr., 1902, pl. iii., figs. 28, 29.

Genus Panope, Menard.

Panope (?) sp. ind.

Pl. i., fig. 11.

Several specimens are probably referable to *Panope*. One specimen shows, on an internal cast of the umbones, a single central tooth in each valve. There is always considerable difficulty in deciding between such genera as *Panope, Pleuromya, Homomya,* etc., although the recent summaries of Bender[39] have helped to lessen the difficulty.

Gen. et. sp. nov.

Pl. i., fig. 6.

There is one specimen of a genus allied to *Fissilunula,* Eth. fil. It has the same type of shell and the peculiar trisected "lunule," while the ligament groove, nymph and raised marginal thickening of the hinge are also very similar. The genus is, however, edentulous (unless there should be any teeth on the extreme anterior portion of the hinge which is not preserved in this specimen). While the cardinal margin in *Fissilunula* is closed, in this genus there is a large gape similar to the pedal gape in the modern *Tridacna,* where, on account of the anomalous orientation of the animal within the shell, the foot is protruded through the cardinal margin. A cardinal gape may also be seen, *e.g.,* in the Jurassic vulsellid genus *Heligmus;* but in that case it is probably of different significance (a byssal gape). Unfortunately, muscle scars and the shape of the shell are unknown at present, so that a complete generic diagnosis must be postponed until other specimens are known.

Genus Natica.

Subgenus Lunatia, Gray.

Natica (Lunatia) variabilis, Moore.

Pl. i., fig. 12.

1870. *Natica variabilis,* Moore, Q.J.G.S., xxvi.. p. 256, pl. x., fig. 15.

1915. *Euspira variabilis,* Newton, Proc. Malac. Soc., vol. xi., p. 232, pl. vi., figs. 20-23.

1920. *(Pseudamaura* or *Ampullina) variabilis,* Etheridge, Jr., Q'land Geol. Surv. Pub. 269, p. 12, pl. ii., figs. 39, 41.

This well-known species, abundant in the collection, has been referred by various authors to *Delphinula, Pseudamaura, Ampullina,* and *Euspira. Delphinula,* which is not a member of the *Naticidae,* is ineligible. The reflection of the inner lip, only above the umbilicus, removes it from *Pseudamaura,* and there is no smooth umbilical band as in *Ampullina.* The spire is not so high as in *Euspira,* which, in addition, has no reflection of the inner lip. The features, however, agree entirely with *Lunatia,* Gray, to which subgenus it is here referred.

Of allied species the most similar is perhaps *N. (L.) puerrydonensis,* Stanton,[40] from the Lower Cretaceous (possibly infra-valanginian) of Patagonia, though the Albian *N. rauliniana,* d'Orb., is also similar.[41]

(39) Bender, Zeit. d. Deutsch. Geol. Gesell., vol. 73 (1922), pp. 24-112.

(40) T. W. Stanton, Rep. Princetown Univ. Exped. to Patagonia, 1901, vol. iv., p. 32, pl. vi., fig. 12.

(41) d'Orbigny, Pal. France. Terr. Cret., vol. ii., p. 160, pl. clxxiv., fig. 1.

Genus VANIKOROPSIS, Meek.

VANIKOROPSIS (?) STUARTI, Etheridge, Jr.

1902. *Vanikoropsis (?) stuarti,* Etheridge, Jr., Mem. Roy. Soc. S. Austr., ii. (1), p. 42, pl. vi., figs. 18-20.

Only one specimen, imperfectly preserved, is in the collection. The generic determination of the species is still uncertain since the aperture is imperfectly known.

Genus DENTALIUM, Linnaeus.

DENTALIUM WOLLUMBILLAENSIS, Etheridge, Jr.

1870. *Dentalium lineatum,* Moore (non Guér.), Q.J.G.S., vol. xxvi., p. 256.

1892. *Dentalium wollumbillaensis,* Etheridge, Jr., Geol. Pal. Q'land, p. 483.

Several broken fragments of this species are present.

Genus DIMITOBELUS, Whitehouse.

DIMITOBELUS CANHAMI (Tate).

Pl. ii., figs. 1-7, 9-11.

1870. *Belemnites australis,* Phillips (pars), Q.J.G.S., vol. xxvi., pl. xvi., figs. 3, 4 (only).

1879. *Belemnites canhani,* Tate, Trans. Phil. Soc. S. Austr. (1878), vol. ii., p. 1.

1924. *Dimitobelus canhami,* Whitehouse, Geol. Mag., vol. lxi., p. 412, text figs. 2, 3.

Sp. chars. Guard clavate, flattened in a dorso-ventral direction. Lateral lines not in the centre of the sides but curving on the ventro-lateral portion. These lines may give place anteriorly to a single dorso-lateral groove, or else to a pair of diverging grooves.[42] Pseudal velous with axial projection generally developed.

Remarks. The species is allied to the *D. superstes* (Hector) of New Zealand (U. Albian), the only extra-Australian species known. That species, however, is more cylindrical, and apparently never has the diverging anterior grooves. Pseudal velous and axial projection developed.
Queensland the species is associated with *Prohysteroceras, Inflaticeras,* and other Upper Albian genera.

Dimitobelus stimulus, n. sp.[43]

Pl. ii., figs. 8, 12-17.

Sp. chars. Guard only very slightly clavate, slightly flattened in a dorso-ventral direetion. Lateral lines straight and in the centre of the sides. These lines may give place anteriorly to either a single groove or to a pair of diverging grooves. Pseudal veolus and axial projection developed.

Remarks. This species differs from *D. canhami* in two respects: the guard is less clavate in form and the lateral lines are straight and central. It is very closely related to that species and, like it, generally develops diverging dorso-lateral and ventro-lateral grooves. Both *D. canhami* and *D. stimulus* are represented by a very large number of specimens.

Dimitobelus stimulus, var. **extremis,** n. var.

Pl. ii., figs. 18-20.

This name is proposed for the longer and more cylindrical forms of *D. stimulus.* It is almost equidimensional, though a slight dorso-ventral flattening is still apparent. The lateral lines are straight and strictly central, as in

[42] See Whitehouse, Geol. Mag., vol. lxi., 1924, p. 412, figs. 2, 3.

[43] Referred to previously (Whitehouse, *loc. cit.,* p. 412).

D. stimulus proper. The writer had previously[44] regarded it as a distinct species, but it is probably more correct to regard it merely as a variety of *D. stimulus*.

In conclusion, the writer wishes to thank Prof. J. W. Gregory and the University of Glasgow for the loan of the collection, the University of Queensland and the Sedgwick Museum (Cambridge) for facilities for carrying out the examination, and the British (Natural History) and Bath Museums for permission to examine the Hudlestone and Moore collections, respectively.

DESCRIPTION OF PLATES I. AND II.

(All figures natural size.)

PLATE I.

Figs. 1-3. *Pseudavicula anomala* (Moore). 1. Artificial cast of the external mould of a young specimen (left valve). 2. Hinge-line of a left valve showing long posterior ligament pit. 3. Artificial cast from the umbo of an external mould (right valve) showing the slight flexing of the cardinal margin, giving a rudimentary type of articulation.

Fig. 4. *Modiola cupula*, n. sp. Artificial cast of the external mould of a right valve.

Fig. 5. *Thracia primula*, Hudl. Left valve.

Fig. 6. Gen. et. n. sp. View of right valve from above showing trisected lunule, nymph, posterior ligament pit and "dorsal" gape.

Figs. 7, 8. *Gari elliptica*, n. sp. 7. Internal mould (right valve) showing muscle scars, impression of anterior radial ridge, and pallial sinus with the linear ventral extension. 8. Left valve with shell partly preserved. Impression of anterior radial ridge visible.

Figs. 9, 10. *Tatella (?) aptiana*, n. sp. 9. Internal mould showing "bisected" appearance of umbonal region, muscle scars, impression of anterior radial ridge and shallow pallial sinus. 10. Artificial cast of hinge-line from an internal mould (right valve) showing two cardinal and one lateral teeth and median umbonal thickening.

Fig. 11. *Panope (?)* sp. ind. Artificial cast of hinge-line from an internal mould.

Fig. 12. *Natica (Lunatia) variabilis*, Moore. Specimen showing portion of reflected inner lip above the umbilicus.

PLATE II.

Figs. 1-7, 9-11. *Dimitobelus canhami* (Tate). 1-7. Ventral view of specimens in different stages of growth (fig. 7, of a form transitional to *D. stimulus*). 10. Showing early stage in formation of axial projection. 9. Lateral view of specimen. 10. Showing divergent grooves. 11 *a, b, c*. Same specimen as fig. 4. 11 *b*. Showing curving lateral lines. 11 *c*. View from above showing axial projection.

Figs. 8, 12-17. *Dimitobelus stimulus*, n. sp. 8. Showing early stage in formation of axial projection. 12-16. Ventral views of specimens in varying stages of growth. 14. Holotype refigured in fig. 17 *a, b*. 17 *b*. Lateral view showing central and straight lateral lines.

Figs. 18-20. *Dimitobelus stimulus*, var. *extremis*, nov. Ventral views.

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[44] Whitehouse, *loc. cit.*, p. 412. The name was then incorrectly printed as *extremus*.